ascent and descent and the moisture of the air. If the air is not cloudy and the ascending gradients have been the same as the descending gradients, then, the resulting annual average will be the mean of the two figures given on any line in Table 3, that is to say, it will always be 0.98, and will, therefore, be independent of radiation. In other words, in this ideal case of a cloudless atmosphere and rapid convection, the radiation effect is uniformly distributed throughout the mass, and does not affect the vertical gradient, but, of course, this is far from being the actual condition of the earth's atmosphere.

THE INTERNATIONAL ELECTRICAL CONGRESS AT COMO, ITALY.

An International Electrical Congress was held, September 18–25, 1899, at Como, Italy, in connection with the so-called Volta Electrical Exposition. Modern electrical science began with the work done by Volta, who was a native of Como. The exposition opened with brilliant promise early in the present year, and, notwithstanding the disastrous fire that soon followed, the exposition and the congress form an interesting epoch in the history of electricity. The congress was opened with an address by Colombo, president of the Italian Electro-Technic Association, who also represented the minister of public instruction. Many of the most distinguished electricians were present. Among the items that may especially interest meteorologists, we quote the following from the report by Martinez in The Electrical World and Engineer of October 21, page 615:

Professor Blaserna desired the congress to commit itself in favor of the adoption of the double trolley, or of accumulator traction, for lines passing in the vicinity of scientific laboratories. The proposition was not received with much favor by the audience, which was largely composed of a modern element, to whom the disturbances of a galvanometer in a laboratory had much less importance than the economy of electric traction.

Mr. Gisbert Kapp expressed the opinion of the majority of those present in saying that savants, instead of asking that electric traction systems, which gave such great advantages to the majority of citizens, should be changed, should endeavor to perfect their instruments, so that they would not be disturbed from that cause, and, if this can not be done, they should move their laboratories to the country, far away from electric railways.

M. Campelio expressed his agreement with Mr. Kapp.

Mr. Pinna, director of the Turin electric plant, said that accumulator cars differed little from the trolley in their effects on delicate instruments.

Mr. Mengarini, director of the electrical plant at Rome and engineer of the project of transportation of power from Tivoli to Rome (2,000 horse power at 6,000 volts, a rash proposition in 1891), sought to give some satisfaction to Professor Blaserna, in speaking of the serious trouble produced by electric railway return currents on water and gas pipes. He asked, not that the earth return should be prohibited, but that, in the insulation of street railways, all possible precautions should be taken to avoid damage from the return currents.

The discussion having begun to extend over a wide ground, the president adjourned it to the next meeting, and gave the floor to Professor Blaserna, who read a paper on the variation of the earth's terrestrial magnetism in antiquity. The idea of the investigation was due to a learned and very modest coadjutor of Professor Blaserna, Dr. Folgheraiter, of the University of Rome. Dr. Folgheraiter had observed that earthenware will preserve indefinitely the magnetism that it possessed when it was baked. Etruscan vases, roman bricks, etc., he found presented magnetic phenomena so striking as to enable the terrestrial magnetic conditions existing when they were baked to be deduced. The etruscan vases of the year 600 B. C. showed with certainty that at that epoch the direction of the terrestrial magnetic field was almost vertical at Rome and in central Italy. Professor Blaserna expressed the hope that similar observations would be made in other countries.

* * * * * * *

At the joint session with the Italian Physical Society, on September 21, Professor Somigliano of the University of Como, discussed the changes of levels in the Italian lakes, a matter that was also observed by Volta, in connection with Lake Como. This lake, as well as others in Italy, is subject to abrupt changes of level which cannot be explained on the supposition of increased flow of water from the streams flowing therein. Recently instruments have been installed to make observations on Lake Garda, with a view to making a careful study of the phenomena. Professor Chistoni gave some interesting details on electrical discharges on Mount Cimone, 7,100 feet high high, the highest peak of the Apennines in the Tuscany and Lombardy region. An observatory has been placed on the summit of this mountain, where aerial conductors have been installed to study the phenomena of atmospheric electricity, which so much interested Volta.

Professor Voltena read a paper of capital importance on "Energy" in the treatment of which a new method of mathematical analysis was followed.

Professor Lemstrom spoke of the artificial reproduction of the aurora borealis. He advanced the conclusion that there is in the atmosphere a permanent electrical current vertical inflow. Professor Wiedemann did not agree with this opinion, observing that we can not have luminous phenomena with differences of potential as small as those mentioned, which, however, may be caused by alternating currents of high frequency.

In the afternoon of September 22, at the meeting of the Italian Physical Society, Professor Maragoni, of Florence, gave a summary of the different theories of the formation of hail, and concluded that the theory of Volta still remains the most plausible, if slight modifications are applied to it.[1] The discussion was participated in by several of the members.

Señor Zublena proposed that the meeting should express an opinion in favor of the encouragement of theoretical and practical researches relating to hail, the occurrence of which in certain parts of Italy constituted a real affliction.

* * * * * * *

Professor Bongiovanni showed an apparatus illustrating the phenomena of terrestrial magnetism, and M. Arno made some interesting experiments on the rotations of insulating disks by electro-static action.

* * * * * * *

At the last meeting of the Physical Society, Mr. Rizzi, of Naples, read a paper on the magnificent colorations in the Gulf of Naples. He showed that the explanations which have thus far been given concerning the marvelous coloring of the sea and of the sky in that locality do not suffice.

The meeting expressed the wish that the Italian Government should undertake the publication of the complete edition of all the works of Volta, as it has already done for the works of Galileo.

INSTRUCTIVE LABORATORY EXPERIMENTS.

On another page we publish a short contribution by Mr. Ralph B. Marean on whirling columns of mist. This suggests one of many forms of experimentation practicable in physical laboratories, and essential to the development of exact meteorological science.

It is well known that determinations of the coefficient of viscosity of the air have been made by exact observations upon whirls driven by rapidly-revolving cylinders or circular plates. But in these experiments the inertia of the moving masses is so great that the viscosity becomes a minor matter and is not determined with all the precision that is desirable.

The mist whirls seen by Mr. Marean can, undoubtedly, be formed and observed at pleasure by proper laboratory arrangements. If, as he describes, a whirl of small height but considerable diameter is observed beginning in a lower stratum of mist, but finally is converted into a small, slender, rapidly-rotating column which ascends and is finally converted into a horizontal cloud in which there is no rotation, then it is evident that the ascent is due to the slight buoyancy of the original mass, and probably depends almost wholly upon its having a temperature slightly higher than its surroundings, but the disappearance of the rotation depends on the inter-

[1] It is proper for the readers of the MONTHLY WEATHER REVIEW to remember that according to the theory of Volta, hailstones grow by accretion, as they are alternately repelled upward and downward electrically, between two oppositely charged layers of clouds. This working hypothesis of a century ago is now obsolete in meteorology, and wholly replaced by the convective processes fully explained by Ferrel and the thermo-dynamic processe explained by von Bezold, and abundantly confirmed by observations in balloons and on mountain tops.—ED.